

NITROUS OXIDE ANNEAL OF TEOS/OZONE CVD FOR IMPROVED GAPFILL

ABSTRACT OF THE DISCLOSURE

A method of filling a gap defined by adjacent raised features on a substrate includes providing a flow of a silicon-containing processing gas to a chamber housing the substrate and providing a flow of an oxidizing gas to the chamber. The method also includes depositing a first portion of a film as a substantially conformal layer in the gap by causing a reaction between the silicon-containing processing gas and the oxidizing gas. Depositing the conformal layer includes varying over time a ratio of the (silicon-containing processing gas):(oxidizing gas) and regulating the chamber to a pressure in a range from about 200 torr to about 760 torr throughout deposition of the conformal layer. The method also includes depositing a second portion of the film as a bulk layer. Depositing a second portion of the film includes maintaining the ratio of the (silicon-containing processing gas):(oxidizing gas) substantially constant throughout deposition of the bulk layer and regulating the chamber to a pressure in a range from about 200 torr to about 760 torr throughout deposition of the bulk layer. The method also includes exposing the substrate to nitrous oxide at a temperature less than about 900°C to anneal the deposited film.

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